UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,254	02/14/2001	Erwin Koller	004501-531	9935

21839 7590 07/01/2004

BURNS DOANE SWECKER & MATHIS L L P
POST OFFICE BOX 1404
ALEXANDRIA, VA 22313-1404

EXAMINER	
BELLO, AGUSTIN	
ART UNIT	**PAPER NUMBER**
2633	5

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/782,254	KOLLER, ERWIN	
	Examiner	Art Unit	
	Agustin Bello	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-5 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-5 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 14 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 4.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Gnauck (U.S. Patent No. 6,509,993).

Regarding claim 1, Gnauck teaches a method for transmitting binary data (e.g. bits) at a rate of R bits per second (e.g. 40 Gbits/s of column 5 lines 40-41) via a dispersive optical conductor (reference numerals 2 and 3 in Figure 1) of length d between a transmitter (reference numeral 1 in Figure 1) and a receiver (reference numeral 4 in Figure 1), where the transmitter (reference numeral 1 in Figure 1) comprises a light source (column 3 lines 29-33 and column 4 lines 23-32) which produces optical pulses (e.g. "a series of modulated optical pulses" of column 3 lines 29-33) with a transmission pulse width τ (e.g. "3ps pulses" of column 5 lines 41-42), the pulses are passed through the optical conductor (reference numerals 2 and 3 in Figure 1) to the receiver (reference numeral 4 in Figure 1) and in the process are broadened by a value $\Delta\tau$ (as seen in the comparison of Figures 14 and 16) as a consequence of the optical conductor having a

dispersive characteristic (column 1 lines 44-49), the receiver comprises a light detector (column 3 lines 44-48), in which the optical pulses arrive with a reception pulse width $\tau+\Delta\tau$ (e.g. 0.026ns of pulse width seen in Figure 16), characterized in that the transmission pulse width τ (e.g. "3ps pulses" of column 5 lines 41-42) is less than one bit period 1/R (e.g. "25ps" of column 1 lines 60-65), and the reception pulse width $\tau+\Delta\tau$ is approximately equal to one bit period l/R (e.g. $\tau+\Delta\tau = 0.003ns + 0.023ns = 0.026ns \approx 0.025$ ns). In other words, the transmitter generates and transmits a pulse having a width of $\tau = 3ps$ (e.g. "3ps pulses" of column 5 lines 41-42) which is equal to 0.003ns after conversion from picoseconds to nanoseconds. This 0.003ns pulse undergoes dispersion in the transmission fiber (column 1 lines 44-49), thereby inducing a broadening of the original 0.003ns pulse to a final width of 0.026ns (as seen in Figure 16), hence the broadening value $\Delta\tau = 0.023ns$. The final pulse width at the receiver (0.026ns as seen in Figure 16) is approximately equal to 0.025ns or 25ps, and 25ps is the width of one bit period 1/R (e.g. "25ps" of column 1 lines 60-65). Therefore, Gnauck clearly meets the limitation that the original transmitted pulse width, broadened by the dispersion in the transmission fiber, results in a pulse width that is approximately equal to the width of one bit period at the receiver ($\tau+\Delta\tau \approx 1/R$).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gnauck (U.S. Patent No. 6,509,993).

Regarding claim 2, Gnauck differs from the claimed invention in that Gnauck fails to specifically teach that the transmission pulse width τ is selected as a function of the transmission distance d. However, Gnauck discloses computer simulations that indicate that shorter transmission pulse widths (e.g. "3ps" of column 4 lines 44-64) produce more well-defined pulses at the receiver than long transmission pulse widths (e.g. "12ps" and "9ps" of column 4 lines 44-64) for a given distance of 480km. One skilled in the art would clearly have recognized from the computer simulations of Gnauck that the transmission distance and transmission pulse width are related in that, given a distance d, a larger transmission pulse width would produce a more poorly defined pulse at the receiver than a short transmission pulse width (column 4 lines 60-64). Clearly, one skilled in the art would have been motivated to select a transmission pulse width as a function of the transmission distance d in order to produce a well-defined pulse at the receiver. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to select the transmission pulse width τ as a function of the transmission distance d.

6. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gnauck (U.S. Patent No. 6,509,993) in view of Frisken (U.S. Patent No. 5,508,845).

Regarding claim 3, Gnauck differs from the claimed invention in that Gnauck fails to specifically teach that a sequence of pulses at the receiver at least approximately represents an NRZ signal. However, the use of the NRZ format in a dispersion compensating transmission system is well known in the art. Frisken, in the same field of pulse width modification for the reduction of dispersion effects, teaches the use of an NRZ signal (column 6 lines 6-10, 60-66 and

reference numeral 64 in Figure 7) wherein a sequence of pulses at the receiver at least approximately represents an NRZ signal (e.g. "very little pulse degradation and only minimal pulse interaction" of column 6 lines 60-66). Furthermore, Gnauck suggests that the signal transmitted through the system can include a NRZ signal (column 1 lines 51-56) at twice the bit rate for a conventional NRZ signal, thereby suggesting that the sequence of pulses at the receiver at least approximately represents an NRZ signal since the purpose of Gnauck is to counter the effects of dispersion. One skilled in the art would have been motivated to allow the sequence of pulses at the receiver to at least approximately represents an NRZ signal in order to eliminate the need for clock pulses, a well known benefit of NRZ signals. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to allow the sequence of pulses at the receiver taught by Gnauck to at least approximately represent an NRZ signal, as taught by Frisken, in order to eliminate the need for clock pulses as is well known in the art.

Regarding claim 4, Gnauck differs from the claimed invention in that Gnauck fails to specifically teach that the distance d is more than 500 km. However, Gnauck does teach that a transmission distance of 480-km can be traversed by a width-reduced pulse (e.g. 3ps) with excellent results at the receiver (column 4 lines 44-64). Furthermore, Frisken (column 6 lines 60-66) teaches it is well known in the art that pulse-width communications at distances up to 2000 km are achievable by choosing the pulse width of the transmission signal according to the bit rate and dispersion of the system (column 3 lines 39-42). One skilled in the art would clearly have recognized from the disclosures of Gnauck and Frisken that a distance of greater than 500km could have been achieved by the method of Gnauck in that the width of the pulse could have been reduced even further to, for example, 1ps thereby allowing the pulse to propagate even

further with excellent results. One skilled in the art would have been motivated reduce the pulse width of the transmitted pulse further than that disclosed by Gnauck in order to achieve a distance greater than 500km, as Frisken has shown is possible, thereby permitting communication over distances into the thousands of kilometers (column 3 lines 39-42). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to further reduce the pulse width of the transmitted pulse of Gnauck in order to transmit the pulse a distance d greater than 500km as Frisken has shown is possible by choosing the pulse width of the transmission signal according to the bit rate and dispersion of the system.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gnauck (U.S. Patent No. 6,509,993) in view of Porter (U.S. Patent No. 4,713,841).

Regarding claim 5, Gnauck fails to specifically teach that said method is used for synchronous data transmission. However, being that the system of Gnauck includes all of the steps recited in the method of claim 1, it is clear that the method of Gnauck could also be used for synchronous data transmission as claimed. Furthermore, Porter, in the same filed of pulse-width communications, teaches that pulse-width communications are capable of supporting synchronous data transmission (see abstract). One skilled in the art would have been motivated to use the method of Gnauck for pulse-width synchronous data transmission as disclosed by Porter since the method of Gnauck allows a pulse to be transmitted a great distance by taking advantage of the chromatic dispersion produced by the fiber. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to use the method of Gnauck for synchronous data transmission according to Porter in order to achieve a great distance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agustin Bello whose telephone number is (703)308-1393. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703)305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Agustin Bello
Examiner
Art Unit 2633

AB

A. Bello